

A Framework for Understanding Telework

Introduction and Definition of Terms

This paper summarizes current understanding of what motivates telework, and then uses the NPTS travel survey to identify teleworkers, describing how they differ from “traditional” workers. The paper concludes by identifying three areas of potential public concern provoked by the growth of telework.

Defining teleworkers as those who regularly work at alternative worksites to save commuting time, including their home, then nearly 17% of workers teleworked in 1995, according to the 1995 Nationwide Personal Transportation Survey (NPTS). About 6% of all workers worked at home on a given day in that year and another 9% telecommuted regularly. Mobile workers either based at home or without any fixed workplace, comprised another 2%.

On September 13, 2000, the International Telework Association and Council’s (ITAC)¹ website stated that telework is: “. . . a work arrangement in which employees work at alternative worksites . . . on average at least eight hours every two weeks . . . provided that . . . (this) reduces the time and/or distance associated with the employee’s commute . . .”

It may surprise some people that telework would be defined primarily by the location at which work takes place, and secondarily by frequency and effects on commutation, rather than by the use of telecommunication devices. But the argument can be made that requiring telecommunication by definition would be largely redundant, as nearly all modern work arrangements at alternative worksites are facilitated or enabled by telecommunication in some way. Perhaps more significantly, this definition emphasizes the policy link between telework and transportation, and makes it possible to use transportation datasets to better understand telework. The NPTS is the source of the estimates offered in this paper.

Table 1 is a typology of teleworkers that groups work arrangements into seven exhaustive and mutually exclusive categories according to where people work.² The first six categories are all types of telework. The seventh category, called “traditional workers,” provides a baseline for comparison, as these people do not work at alternative worksites, and thus are not teleworkers. Nonetheless, over time even the work and behaviors of the baseline group are being affected by the telecommunication options available to them and to their co-workers.

Table 1: Typology of Teleworkers^a

	Information workers ^b 59%	Non-information service workers ^c 13%	Non-information production workers ^d 28%
1. Home worker Works at home only.	X	X	X
2. Home telecommuter Works at home and at one other non-telecenter workplace location only.	X		
3. Telecenter telecommuter Works at a telecenter and at one other non-home workplace location only.	X		
4. Telecenter worker Works at a telecenter only.	X		
5. Home-based mobile worker Works at home and at two or more non-home workplaces or in the field.	X	X	X
6. Non-home-based mobile worker Does not work at home. Works at two or more non-home, non-telecenter workplaces or in the field.	X	X	X
7. "Traditional" worker (all other workers) Works at only one non-home, non-telecenter workplace location.	X	X	X

Source: Adapted from Helling, Amy and Mokhtarian, Patricia. "Changing Worker Telecommunication and Mobility: Consequences for Planning," under review by the Journal of Planning Literature.

(a) All these work arrangements may be full-time or part-time, and time spent at the various workplaces is unspecified. Workers may be employees of others or self-employed.

(b) Such as lawyers, teachers, financial analysts, data processing technicians. Percentage calculated for managerial and professional specialty, technical sales and administrative support occupations. (Newburger 1999)

(c) Such as nurses, barbers, retail cashiers, daycare workers, security guards. Percentage calculated for service occupations. (Newburger 1999)

(d) Such as agricultural workers, construction workers, manufacturing workers. Percentage calculated for precision production, craft, and repair, operators, fabricators, farming, forestry and fishing occupations. (Newburger 1999)

All of these types of telework share some important commonalities:

- They offer employers ways to reduce costs or increase productivity, or both.
- They offer workers ways to increase their flexibility or increase their productivity, or both.
- They potentially have wide-ranging effects on our society, including how much and where people travel, where people locate their residences and businesses, and what quality of life can be achieved by workers in different occupations.

The first two of these commonalities are the reasons why telework is a growing phenomenon; it offers meaningful benefits to some businesses and individuals. The third commonality is why studying telework is important; it will have other, potentially important consequences, and there is evidence that different telework arrangements lead to different consequences.

Researchers have not studied all of these groups of teleworkers in equal detail. The most is known about telecommuters³ (categories 2 and 3 in Table 1), who have been the subject of substantial research. Home workers, home telecommuters who work more at home than elsewhere, and home-based mobile workers have also been studied. These workers were identified using the Census of Population. They provided the answer “worked at home” to the long-form question, “How did this person usually get to work last week?” Recent studies suggest that telecommunication has made home-based work possible for more people in more varied occupations, and contributed to its increase. However, this leaves many questions about who teleworks unanswered. Utilizing a federally funded data collection effort, one recent paper (Eash, 2000) took the first step toward estimating the size of this group. This author uses this same data source and approach to provide more detail after a brief discussion of the forces motivating telework.

Why Do Employers Offer These Options?

Private employers have found that telework options can have a positive effect on the bottom line in a variety of ways. Some of telecommuting’s benefits to employers have been documented, including improved employment recruiting and retention, reduced expenditures for office and parking space, and productivity improvements for the employer (DuBrin 1991; Mokhtarian 1991a; Tomaskovic-Devey and Risman 1993; Handy and Mokhtarian 1996b). Clearly some types of telework are primarily about cost savings and increasing workers’ productivity, while others have greater benefits for workers themselves, and thus help attract and retain employees. Tomaskovic-Devey and Risman’s results (1993) suggest that employers adopt telecommuting programs for professionals in order to retain them and make them more productive, while they make telecommuting arrangements for clerical staff primarily to reduce costs.

The benefits of teleworking programs to employers are not guaranteed, but are at least partially within the employer’s power to forecast and affect. Thus, there are a number of entities, including private consultants, non-profit groups like ITAC, and government agencies, offering assistance in setting up teleworking programs on the premise that such help will improve the chances of success and benefits to employers.

Employers are now interested in telework chiefly because the relative price of telecommunication has fallen. This gives businesses an incentive to use it to substitute for or complement more expensive inputs, including labor, to reduce costs and/or increase productivity. This becomes particularly important in a tight labor market. For example, the price of mobile telephone service fell nearly 40% between 1996 and 1999. (Wooldridge 1999). Many employers now provide mobile employees with mobile telephones to allow them to communicate from wherever they are, saving time, and thus reducing labor costs for their employers.

Why Do Workers Choose to Telework?

A variety of telecommuting's benefits to employees have also been documented, including savings in time and out-of-pocket costs and greater personal independence as workers seek to broaden their choices of work arrangements, travel, and location (Nilles 1988; Kraut 1989; Mogelonsky 1995; Bagley and Mokhtarian 1997). A worker's time and money are limited and valuable to himself or herself as well as to his or her employer. Thus, if telecommunication allows more efficient use of time, whether for work or for leisure, it also makes time more valuable. This value belongs to the worker if he or she is paid according to output rather than by the hour, though hourly workers also benefit in competitive labor markets.

Mokhtarian and Salomon (1994, 1997) found that the individual's decision to telecommute depends upon the presence of both "drive" and "constraint" or "facilitator" variables. Much of this logic might also apply to the other categories of voluntary telework. Drive variables like commuting stress, long commute time, positive expectations about telecommuting, or a desire to be more productive or to spend more time with family, represent an individual's motivation, without which the worker is unlikely to decide to telecommute, given a choice. Once the motivation exists, greater income and education facilitate telecommuting, while greater age tends to act as a constraint (Mokhtarian and Salomon 1997). In addition, Bagley and Mokhtarian (1997) found evidence that constraints (most notably the suitability of the job for telecommuting) affect individuals' preferences. They also found that familiarity with telecommuting is associated with a stronger preference for it. Accordingly, among those who are motivated to telecommute and are aware of the option, we would expect more telecommuting among certain occupations, and among more educated and higher income workers.

One very concrete reason workers choose to telework, based on the term as defined at the outset of this paper, is to save time they would otherwise spend commuting. This author has written elsewhere about research estimating the effects on travel (Helling and Mokhtarian, under review). Notably, teleworkers may respond to their reduced commute either by increasing or by reducing their non-work-related travel, depending upon their personal situation and desires. You can imagine, for example, that commuting time saved by one teleworker might be used to work in the yard, while another might spend the time driving a child to music lessons. Both these workers benefit, though the gross travel of the second may be undiminished. However, research does suggest that telework can affect travel patterns, for example causing telecommuters to choose to travel to destinations closer to home (Saxena and Mokhtarian, 1997). This may be a manifestation of the greater value of their time, noted earlier. Gurstein's (1996) survey results indicated that workers use cafes, recreation centers, gyms and parks less when they work at home. Home

workers choosing work over other non-income-producing activities like time-consuming types of recreation and non-essential travel is consistent with the hypothesis that they, like home-based telecommuters, have higher opportunity costs of time than the same individuals in traditional work arrangements. This would also match time use research indicating that highly paid professionals and managers, a group well represented among teleworkers, were among the likeliest to work very long hours (Scott, 1999).

Who Teleworks?

The empirical work in this paper draws on the 1995 NPTS. The NPTS is a periodic federal survey used to inventory the daily personal travel of the civilian, non-institutionalized population of the United States. The most recent NPTS was conducted by telephone interview with 42,033 households nationwide between May 1995 and July 1996. The data used here are from both the randomly selected, stratified, national sample and from supplemental samples in several geographic areas. All of the calculations have been appropriately weighted to expand the sample data to estimates for the U.S. population. The questionnaire contains both questions asked about each household⁴ in the sample, and person-level questions asked about each household member aged five years and older. The data presented here come from the 1995 NPTS person file. The person file includes data items collected for each surveyed individual in the household, and repeats some information about the household, including household size, income and number of workers, as reported in this paper.

Table 2 shows how teleworkers can be defined so as to be identifiable using the 1995 NPTS. Notice that those who work at telecenters cannot be distinguished from “traditional” workers by the questions in the 1995 NPTS, but that telework categories 1, 2, 5, and 6 can be operationally defined as suggested by ITAC using NPTS questions. This means that the total numbers of U.S. workers in each of these telework categories can be estimated, as well as each group’s share of the workforce, something first done by Eash (2000). It also means that, once identified, the attributes of these groups can be studied, allowing a better understanding of who teleworks. The NPTS is intended as “the nation’s inventory of daily travel” (U.S. Department of Transportation, 1997) and is a complete and well documented source of these data. The remainder of this section will discuss the different types of teleworkers and their differences from “traditional” workers.

Table 3 shows that “traditional workers” were still in the overwhelming majority in 1995, representing 82.5 % of all workers. Home telecommuters who telecommuted at least once every two weeks made up the second largest group with 8.8%.⁵ Workers who listed home as their primary work location made up another 5.7% of workers, excluding those who traveled significantly. The home-based mobile workers, who did travel significantly, were a very tiny group, representing only 0.1% of all workers. However other mobile workers, who report no fixed place of work made up about 2.1% of workers.

All teleworkers were more likely to be male than were “traditional” workers, 53% of whom were male. Males particularly dominated the mobile worker categories. All groups seemed to average about 1.1 non-working persons per household. With the exception of non-home-based mobile workers, teleworkers generally seemed to have smaller households than “traditional” workers.

Table 2: Operational Definitions and 1995 Estimates of Teleworkers by Type^a

	U.S. Total ^b	Percent
1. Home worker Workers who give their primary workplace location as "at or out of home," and drive less than 10 miles on a given day as part of work.	7,497,936	5.7%
2. Regular home telecommuter (at least 8 hours every 2 weeks) Workers who give a non-home primary workplace and report that they have worked at home instead of traveling to their usual workplace 2-4 times in the past two months.	11,642,867	8.8%
3. Telecenter telecommuter ^c Cannot be distinguished from "traditional" workers using the 1995 NPTS.	--	--
4. Telecenter worker Cannot be distinguished from "traditional" workers using the 1995 NPTS.	--	--
5. Home-based mobile worker Workers who give their primary workplace location as "at or out of home," and drive more than 10 miles on a given day as part of work.	166,462	0.1%
6. Non-home-based mobile worker All workers who report they have "no fixed (primary) workplace."	2,811,337	2.1%
7. "Traditional" worker (all other workers) Workers who give a non-home primary workplace and report that they worked at home instead of traveling to their usual workplace fewer than twice in the past two months.	108,622,970	82.5%
Total 1995 teleworkers and traditional workers represented by NPTS responses ^d	130,745,572	99.3%
TOTAL 1995 WORKERS	131,697,367	100.0%

Source: Eash, 2000, and the 1995 Nationwide Personal Transportation Survey.

a. Types defined in Table 1 are estimated here based on workplace location, frequency of work at home and work-related travel behavior from the 1995 NPTS.

b. Responses to the 1995 NPTS have been expanded to national estimates based on their sample weights.

c. Probably a very small number of workers.

Table 3: Attributes of Four Types of Teleworkers, “Traditional” Workers, and All Workers Responding to the 1995 NPTS

	1	2	5	6	7	Total
	Home workers	Regular home telecommuters	Home-based mobile workers	Non-home-based mobile workers	"Traditional" workers (all other workers)	All workers responding to 1995 NPTS ^a
N (unweighted)	2,863	4,727	62	1,023	42,853	51,928
Expanded estimate for the U.S.	7,497,936	11,642,867	166,462	2,811,337	108,622,970	131,697,367
Percent of all workers	5.7%	8.8%	0.1%	2.1%	82.5%	100.0%
Males	57.1%	57.5%	79.3%	64.8%	53.0%	54.0%
Females	42.9%	42.5%	20.7%	35.2%	47.0%	46.0%
Aged 16-24	5.8%	6.2%	0.1%	17.6%	16.6%	15.0%
Aged 25-34	20.8%	27.1%	33.1%	27.6%	27.7%	27.3%
Aged 35-44	31.5%	31.8%	24.7%	24.1%	36.5%	27.2%
Aged 45-54	22.3%	22.2%	16.9%	17.1%	18.9%	19.3%
Aged 55-64	12.2%	9.1%	21.0%	9.4%	8.0%	8.4%
Aged 65 or older	7.4%	3.6%	4.2%	4.2%	2.3%	2.8%
No answer or under 16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hispanic	6.2%	7.6%	5.0%	12.5%	9.7%	9.4%
Not Hispanic	93.4%	92.1%	95.0%	87.2%	90.1%	90.4%
No answer	0.4%	0.3%	0.0%	0.3%	0.2%	0.2%
White	87.7%	85.3%	64.9%	79.5%	77.3%	78.7%
Black or African-American	4.7%	6.9%	26.2%	10.6%	12.2%	11.3%
Asian	1.5%	2.2%	0.0%	2.4%	2.4%	2.3%
Other race	4.2%	4.3%	9.0%	6.3%	6.8%	6.5%
No answer	1.8%	1.3%	0.0%	1.1%	1.2%	1.3%
Household income < \$25,000	20.8%	12.8%	10.9%	23.3%	17.7%	17.6%
HH income \$25,000 - \$49,999	33.9%	30.0%	40.0%	32.6%	37.5%	36.5%
HH income \$50,000 - \$74,999	14.6%	19.8%	28.2%	12.2%	17.4%	17.3%
HH income \$75,000 - \$99,999	7.5%	12.5%	0.1%	6.9%	7.6%	8.0%
Household income > \$100,000	6.7%	11.3%	3.6%	2.5%	4.6%	5.3%
No answer	16.4%	13.7%	17.1%	22.5%	15.1%	15.4%
Did not graduate from high school	8.7%	4.0%	9.5%	14.5%	9.7%	9.2%
Graduated from high school	29.9%	19.5%	23.7%	37.8%	33.4%	31.9%
Some post-high school education-	27.9%	24.4%	25.6%	23.6%	29.0%	28.3%
Graduated from college	20.9%	26.7%	9.3%	15.0%	17.2%	18.1%
Some grad school or a grad degree	11.9%	25.1%	31.8%	7.8%	10.4%	11.8%
No answer	0.7%	0.2%	0.0%	1.4%	0.3%	0.6%
Mean household size (S.D.)	3.02 (1.42)	3.00 (1.39)	2.87 (1.46)	3.22 (1.44)	3.13 (1.40)	3.11 (1.41)
Mean workers in household (S.D.)	1.90 (0.77)	1.88 (0.74)	1.77 (0.59)	2.05 (0.95)	2.01 (0.85)	1.99 (0.84)

Source: 1995 Nationwide Personal Transportation Survey.

a. Excludes 400 respondents who were workers, but could not be classified as teleworkers or "traditional" workers because they did not answer questions about their work location or frequency of work from home.

Home workers, or people who said they worked the most hours at or out of home, showed the highest proportion of females among teleworkers, at 42.9%. Home workers were also older than “traditional” workers, and less likely to be Hispanic. A larger proportion of home workers than “traditional” workers were white. One hint that home workers span some very different occupations is the evidence in Table 3 that home workers are more concentrated at the ends of the income distribution than are “traditional workers.” Larger proportions of home workers have household incomes both under \$25,000 and over \$100,000 than is the case among “traditional” workers. A larger share of home workers than “traditional” workers have completed college or gone to graduate school or received a graduate degree, meaning that home workers have higher levels of educational attainment than traditional workers.

Regular home telecommuters, or people who had a non-home work location, but reported working at home instead of traveling to their usual workplace at least one day every two weeks, were more heavily male and younger than home workers, but still much more concentrated in older age groups than “traditional workers.” These workers also included a somewhat higher proportion of Hispanics than among home workers, though not as many as among “traditional” workers. They also had slightly higher proportions of non-white workers. Income was clearly higher among regular home telecommuters than among “traditional” workers. Household incomes of \$75,000 or more were fairly common among regular home telecommuters, (23.8%), but much less so (12.2%) among “traditional” workers. This was matched by educational attainment, since 51.8% of regular home telecommuters had graduated from college, while this was true of only 27.6% of “traditional” workers.

Home-based mobile workers were a very tiny group in the NPTS sample; and hence the likelihood is greater that the sample provides an inaccurate picture of this population than for the other telework categories. They appear from the sample to be predominantly male, and oddly concentrated among the young middle-aged and those over 55, compared to “traditional” workers. They have the smallest proportion of Hispanics and the largest proportion of blacks of any worker categories. Most are in middle income categories. A high proportion have been to graduate school.

Non-home-based mobile workers are a much larger group, and one that makes better sense. This group probably includes many construction tradespeople, repair technicians and transportation and delivery workers. This group is predominantly male, and has a higher proportion of the youngest and the oldest workers than “traditional” workers. These workers are 12.5% Hispanic, compared to 9.7% among “traditional” workers. However, this group has a smaller proportion of black workers than “traditional” workers. More of these workers are in the lowest household income category of less than \$25,000 per year (23.3%) than is the case for “traditional” workers (17.7%). Only 46.4% of non-home-based mobile workers have more than a high school education, while 56.6% of traditional workers have more than a high school education.

“Traditional” or non-teleworking workers, by far the largest group, include a slight majority of males, and were concentrated in the baby-boom ages of 35-44 in 1995. About 9.7 % of them were Hispanic, and 12.2% were black. Another 2.4% were Asian. It is possible that some of the 6.8% who reported their race as “other” were white Hispanics. The modal household income category for “traditional” workers was between \$25,000 and \$49,999 per year. Only 27.6% had graduated from college.

Unfortunately, the NPTS does not ask a question about occupation.⁶ Many authors have speculated that telework will only affect occupations dealing primarily in information, a subset that had grown to include 59% of workers by 1997 (Newburger 1999). Handy and Mokhtarian (1996a) note that all the “telecommuting-conducive occupations” they identify have been experiencing strong growth nationwide. But telework involves more than telecommuting, and affects a far more diverse set of occupations, potentially including truck drivers, insurance claims adjusters, health services inspectors, realtors, construction workers, and even seasonal farm workers. These and other workers work at multiple or alternate worksites, and many use computers or mobile telecommunication devices to be more productive and to meet personal communication needs (Mokhtarian 1991b; Office of Technology Assessment 1995). Some people could not work if they had to commute, or commute daily (Kraut 1989; Mokhtarian 1997). Another group of workers rely on telecommunication to manage a complex personal life, and would leave the labor force if, for example, they could not check on their young children from work (Berger 2000). Telecommunication may make it possible for these groups (which include the temporarily or permanently disabled and many working parents) to work.

Although the use of particular equipment is not how we have defined telework, it is important to know how widespread such equipment and services are. Overall, 94.1% of all households in the U.S. had telephones in 1998 (National Telecommunications and Information Administration, 1999). More mobile than fixed line telephones have been put in service in each year since 1996 (Wooldridge 1999). The highest degree of computer use among workers was in managerial and professional occupations in 1997, followed by technical, sales, and administrative support occupations. Together these two groups encompass most information workers. The Current Population Survey found half of employed adults used a computer in their work in 1997, up from one-quarter in 1984 (Newburger 1999). Even 8% of men (13% of women) in farming, forestry and fisheries occupations used computers in their work in 1997 (Ibid.) Gurstein (1996) found that 84% of her sample of home based workers had computers. but computers were much more common in affluent households; in 1997, 76% of American households with incomes of \$75,000 or more had computers, but fewer than 16 of households with incomes below \$25,000 did. From the same source it appears that about 4% of American adults used computers at home to connect to work or school in 1997.⁸

What Issues Does Telework Raise for the Future?

Other researchers may focus on telework’s implications for private business. This author is interested in the effects telework may have on the public sphere, where far-sighted planning or public policy may be able to enhance telework’s positive potential and reduce its potential for harm if we anticipate these accurately. This author has identified three areas of concern:

- Not all workers will have the option to telework, but those who do will have greater flexibility than other workers, allowing them choices not previously available.
- Those able to telework will have greater productivity and thus earn more than other workers.
- Because telework depends upon telecommunication, it will be susceptible to different kinds of disruptions than work travel.

Gender, education, occupation, income or geographic location may limit an individual's ability to benefit from the changing nature of work, travel and telecommunication.⁹ The consequences of these differences may be magnified by public policy. As I have shown, regular home telecommuters, the largest group of teleworkers in 1995, and one whose growth has been encouraged by public policy¹⁰, differed from "traditional" workers in being more likely male, older, less likely Hispanic, and much more highly educated. The type of telework held disproportionately by younger workers, minority workers and those with less education is non-home-based mobile work.

Many of those able to telework have greater flexibility in work location, and sometimes also in work hours, than those who cannot. This flexibility also gives them additional options in their private lives with respect to when and how much they travel, where they will live, and all of the important dimensions of quality of life that flow from these decisions. For example, choice of work and home location determines whether one lives in a dense urban area, a suburb or even a rural area, and affects the environmental quality and safety one experiences daily, where one's children go to school, and whether other members of the household will be able to find and keep jobs. Lack of locational constraints will allow a subset of workers to locate in places not previously possible, with potentially significant consequences, while others will remain very constrained. Although planners have been interested in telework chiefly as means of reducing travel in vehicles, even telecommuting, the most promising in this regard, seems to have limited long-run potential to reduce congestion. While telecommuting may eliminate some trips, such gains are likely to erode as freed-up capacity induces demand for new trips in the long run. But telework will likely cause a very different mix of people, destinations and trip purposes to occupy the roadways of the future.

Much telework requires some kind of investment—in hardware or software, a remote workspace and/or in the worker him/herself. Such investment is making teleworkers more productive because it provides them with more complete and current information even when they are mobile, and gives individuals greater control over the use of their time, leading to increased earnings and greater work opportunities. These effects increase the value individuals and employers place on time. Those who do not receive such investment from others, and are not able to make it themselves, will fall further behind in productivity, earnings and opportunities.

Finally, we are very familiar with things that can disrupt employees' travel to work: traffic congestion, strikes, fuel shortages, natural disasters, bad weather, and, at a personal scale, car breakdowns. For teleworkers and their employers the challenges are different. A broken connection can stop work that has already begun. Imagine, for example, a lapse that ends vital communication with a worker in the field, or worse, that interrupts tele-surgery. Such disruptions could be caused by congestion ("all circuits are currently busy"), strike, natural disaster, bad weather, malicious vandalism, or, at a personal scale, equipment breakdown or software problems. While these problems may be no greater than those posed by work that depends upon travel, they are less familiar, and will require effort to address.

Conclusion

The estimates in this paper demonstrate that telework is already widespread, and the forces that motivate both employers and employees to accept it seem likely to cause it to increase further. It is also evident from these estimates that the profile of each type of teleworker is different, and all types of teleworkers are different from “traditional” workers. These differences may reflect factors that bar some workers or potential workers from telework. Because telework increases workers’ flexibility and productivity, this will be a disadvantage for those individuals, and potentially a serious concern for our society. At the same time, telework lifts constraints from other groups, possibly opening the door to unanticipated change, in the location of development pressure, for example, or where and how much people travel. Understanding who teleworks will be key both to addressing such issues and to preventing serious disruptions to work and its important results.

Endnotes

¹ The International Telework Association and Council (ITAC) identifies itself as “a nonprofit organization dedicated to promoting the economic, social and environmental benefits of telework” (International Telework Association and Council website, <http://www.telecommute.org>, accessed 9/13/2000).

² In another paper, my co-author and I add to this typology two more categories of contingent workers, who could be at any location, because their work arrangements are also enabled by telecommunication, although they do not meet the ITAC definition of telework. (Helling and Mokhtarian, under review).

³ Home-based telecommuting refers to using telecommunication to accomplish one’s paid work without having to travel from residence to workplace. Nilles coined the term in 1973 “to refer to the partial or total substitution of telecommunications, with or without the assistance of computers, for the twice-daily commute to work.” (Nilles 1988) Handy and Mokhtarian (1996a) summarize evidence that telecommuters telecommute one to two days per week, on average. The second form of telecommuting listed requires the worker to travel to a “telecenter.” The definition of a telecenter used in one recent piece of research is “an office facility shared by remotely-supervised staff of multiple employers, generally on a part-time basis. The center is furnished conventionally (with computers, fax, photocopier, conference room and so on) and is much closer to the participants’ homes than is their regular workplace.” (Varma, Ho, Stanek and Mokhtarian 1998) Such an arrangement typically (though not always) shortens, but does not eliminate, the worktrip. Bagley and Mokhtarian (1997) found that few people prefer to work exclusively from a telecommuting center, though center-based work was attractive to some.

⁴ In general, the NPTS uses the U.S. Census of Population and Housing concept of “household,” meaning all those individuals who together occupy a single housing unit, rather than “family,” meaning those who both live together and are related by birth, marriage or adoption. Household income as measured by the NPTS, however, excludes the earnings of unrelated individuals.

⁵ Handy and Mokhtarian (1995) estimated that about 6% of the California workforce telecommuted at least occasionally in 1991, and that probably around 1.5% telecommuted on a given workday in 1991.

⁶ The 2000 Census will provide occupational information, but will only clearly identify those workers who “usually” worked at home, a group that includes my category 1, and possibly small portions of categories 2 and 5.

⁷ These include the following: executive, administrative and managerial workers; professional specialty workers; technicians and related workers; sales workers; and administrative support workers. Handy and Mokhtarian (1993) estimated that at most 40 percent of the workforce might someday telecommute at least occasionally, based on Nilles’ (1988) assumptions that half of all workers are (and will be) information workers and 80 percent of these are potential telecommuters.

⁸ The Current Population Survey found that 29% of Americans 18 years old and older were users of home computers in 1997, and 14.5 percent of these used their home computer to connect to a computer at work or school. (Newburger 1999)

⁹ Mokhtarian, Bagley and Salomon (1998) found “(W)hile women are more likely than men to prefer telecommuting, they are equally likely to be telecommuters Conversely, there were no occupational differences in the preference to telecommute, but significant variations in the choice of telecommuting” (p. 19). A number of writers have documented the history of exploitative home work, and warn that this may be a serious concern. (Kraut 1989; Huws 1991; Tomaskovic-Devey and Risman 1993).

¹⁰ “(T)he growth of telecommuting can be both accelerated and guided by means of government-induced distortions of the market.” (Nilles 1991, p. 429) For example, the 1990 Clean Air Act Amendments permit telecommuting programs as means of meeting vehicle occupancy goals, and federal transportation funding can be used to start such programs since the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA).

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Before turning to the discussion of Professor Helling's paper, a general issue should be addressed. Participants at the Xavier University Telework Symposium have used a wide variety of definitions for the word "telework." The root, tele, means "at or over a distance," suggesting that the most straight-forward interpretation of "telework" is as work conducted at a distance, presumably away from a primary work site. Professor Helling's definition of telework is in this spirit. On the other hand, many people link the words "telework" and "telecommunications" and infer that telework involves the use of telecommunications technology. Baffour and Betsey (in this volume) use a definition that embodies this idea, defining telework as "working outside the conventional office setting using telecommunications-related technologies to interact with supervisors, co-workers, and clients." Yet another definition is used by Galinsky and Kim (also in this conference volume), who equate telework with "working at home all or part of the time."

The difference in the definitions of telework chosen by the various authors crystallizes the lack of clarity regarding the issues at the heart of the Symposium. As the national dialogue on telework continues, it is important that all concerned with the topic come to some agreement about the nomenclature to be used when discussing the various types of new work arrangements.

Professor Helling's paper makes two contributions to the body of knowledge on telework. She outlines a taxonomy of the various work arrangements that people group together under the term "telework" and, innovatively uses the Nationwide Personal Transportation Survey (NPTS) data to present some descriptive statistics about the people in the resulting categories.

Professor Helling adopts the definition of telework used by the International Teleworking Association and Council (ITAC): "a work arrangement in which employees work at alternative work sites . . . on average at least 8 hours every two weeks . . . provided that . . . [this] reduces the time and/or distance associated with the employee's commute." The ITAC definition appears to be exceedingly inclusive: teleworkers would include most teachers, professors, real estate agents, and, indeed, any worker who does some work at home on a routine basis. On the other hand, self-employed people, many of whom may use their home as the base for their businesses, do not appear to be included (the definition specifies that the worker is an employee). Thus while the ITAC definition used by Helling is too inclusive in some ways, at the same time it excludes a likely growing group of teleworkers who are self-employed. [The definition offered by Dougherty, Andrey, and Johnson (in this volume) also excludes the self-employed and independent contractors.]

Although there are problems with the ITAC definition, it does have the advantage of identifying the critical distinction between telework and other types of work. This distinction derives from the place where the work is done, rather than the type of equipment that is used. The telecommunications revolution has

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altered all work, both work that is on-site and work that is off-site. That is, we are all, regardless of work location, more likely than in the past to use telecommunication technology to conduct our every-day business. The crucial aspect of this revolution for off-site work is that this work arrangement is now feasible for a larger range of occupations, and, therefore, for a greater number of people.

Another reason to focus on the off-site location is that many of the public policy issues associated with “telework” arise specifically because of this characteristic, especially when the off-site location is the worker’s home. Secretary Herman, in her introductory remarks, highlighted a number of these issues:

- the potential difficulty of enforcing protective labor legislation such as minimum wage and child labor laws;
- the problems associated with worker health and safety in the off-site workplace;
- the desirable positive externalities associated with reductions in traffic congestion as more people reduce their commute to work;
- the status of independent contractors;
- the time and monetary savings for workers associated with reductions in commuting;
- the possible savings for firms associated with having fewer workers on-site; and
- the development of “best practices” for managing off-site workers.

In order to determine how best to address these issues, it is important to have at hand information about the characteristics of off-site workers, particularly those who use their home as their primary work site. This is one of the goals of the Helling paper. Using 1995 NPTS data, the paper presents descriptive statistics for four types of teleworkers, as well as “traditional” workers. The four types of teleworkers are home workers, regular home telecommuters, home-based mobile workers, and non-home-based mobile workers. The data includes self-employed workers as well as employees. As Helling rightly points out, what is most immediately clear from the data in Table 3 is that the four categories of teleworkers are quite different; grouping them together for the purpose of developing government policy would be misleading at best. In addition, the category “regular home telecommuters” (people who have an on-site location for their primary work location but report that they have worked at home instead of their usual work place 2 to 4 times over the past two months), which accounts for just over half of all of those defined as teleworkers, is a group that does not really belong if one is concerned with the public policy issues listed above. Most relevant for public policy discussion is the group “home workers.”

The category “home worker” in the NPTS survey includes all workers who give their job location as “at or out of home” and “drive less than 10 miles on a given day as part of work.” This category accounts for 5.7% of Helling’s sample. It is useful to compare Helling’s descriptive statistics in Table 3 with those that my co-author, Elizabeth Field-Hendrey, and I have computed from the 1990 Census of Population. The purpose of this comparison is to highlight the fact that the socioeconomic and demographic characteristics of home-based workers are still not well understood.

Field-Hendrey and I have been studying home-based workers using data from the Primary Use Microsample (PUMS) of the 1990 Census of Population.¹ As does Helling, we use a transportation-to-work question to identify home-based workers. The question asks “How did you usually get to work last week,” and we designate all who answer “worked at home” as a home-based worker. We restricted our study to 25-55 year-olds so that those who are still in school or are in partial retirement are not included. For these reasons, our data are not perfectly comparable with those of Helling. In addition, our data pertain to 1990 rather than 1995.

There are a number of ways in which the picture of home-based workers from the 1990 Census differs from that of homeworkers in the NPTS. These differences can not be completely explained by the difference in the sample definition and year. Helling reports that 5.7% of workers are home-based workers; Field-Hendrey and I report that 3% of workers are home-based workers (This difference may be partially explained by the five years that elapsed between the two sample surveys). Helling reports that 42.5% of home-based workers are female; we find that this proportion is dramatically larger, at 58%. Helling reports that 8.7% of her home-based workers have less than a high school education and 11.9% have more than a bachelor’s degree. In our data, the proportions are reversed: we find that 13.6% of our home-based workers have less than a high school education and 5.5% have more than a bachelor’s degree. Helling does not report the proportion of the home workers in her sample who are self employed, but Field-Hendrey and I find that this proportion is very large, at 63.9%, as compared to just 5.5% for on-site workers. These differences highlight the fact that there is still quite a bit of uncertainty about the characteristics of teleworkers whose primary work site is their own home.²

In conclusion, two points must be highlighted. In order to profitably address the important policy issues raised by Secretary Herman, we need to agree upon both a common set of definitions for the various new work arrangements facilitated by changing technology and a common set of facts about the workers who choose to use these new arrangements.

End Notes

¹ See Linda N. Edwards and Elizabeth Field-Hendrey, “Work Site and Work Hours: The Labor Force Flexibility of Home-Based Women Workers,” Upjohn Conference Volume, Conference on Changes in Working Time in the United States and Canada, forthcoming (a) Edwards, Linda N. and Elizabeth Field-Hendrey, “Home-Based Work and Women’s Labor Force Decisions, *Journal of Labor Economics*, forthcoming (b); and Edwards, Linda N. and Elizabeth Field-Hendrey, “What Do We Know About Home-Based Work? Data from the 1990 Census of Population,” *Monthly Labor Review*, Vol. 118, No. 11, November 1996, pp. 26-34.

² The Census figures in this paragraph come from Edwards and Field-Hendrey (1996).

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